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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/759,059	01/20/2004	Gwo Bin Lee	LEEG3003/EM	6688

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EXAMINER	
LAFOND, RONALD D	

ART UNIT	PAPER NUMBER
1792	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/759,059	LEE ET AL.	
	Examiner	Art Unit	
	RONALD D. LAFOND	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 November 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-13 and 15-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-13 and 15-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The Amendments of November 13, 2007, were received and have been entered. Claims 3 and 14 are acknowledged as canceled. Claims 1, 4 – 7, 9 – 12, and 15 – 22 are acknowledged as amended. This Action is in response to amended Claims 1, 2, 4 – 13, and 15 – 22, which are currently pending.

Claim Objections

2. Claims 1 and 12 are objected to because of the following informalities: Improper grammar. In both of these Claims, the phrase "to restrain the occurrence of electro-osmosis flow" is used. In this context, the word "electro-osmosis" should be replaced with "electro-osmotic". Appropriate correction is required.

3. Claim 12 is objected to because of the following informalities: improper grammar. Lines 7 and 8 of this Claim state, "applying heat treatment to the glass microchannels coated with **organic organic base** solution to cross-link the liquid materials". The bolded words, "organic organic base", should be changed to "the organic-based" as in Claim 1. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 6, 11, 12, 17, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang, et al. (United States Patent 6,326,083 B1, hereafter Yang) in view of Holloway (United States Patent 5,110,439) and Novotny, et al. (United States Patent 5,074,982, hereafter Novotny).

6. Regarding Claims 1 and 12, Yang teaches a method of modifying the surface of glass substrates comprising the following steps: forming a film by coating the surface of glass substrates by filling glass microchannels (see Column 2, lines 51 – 55) with a liquid organic-based solution (see Column 11, lines 61 – 67, and Column 12, lines 1 – 8); removing the superfluous organic-based liquid (see Column 12,

lines 8 – 10); applying heat treatment to the glass microchannel substrates coated with the organic-based solution to cross-link and solidify the liquid organic materials (see Column 12, lines 10 – 13). Yang also implicitly teaches the method wherein said liquid organic-based solution, after the heat treatment, isolates Si-OH groups on the surface of glass substrates from the environment (see again Column 11, lines 61 – 67, and Column 12, lines 1 – 13), because the silylating surface derivatization inherently isolates the Si-OH groups on the surface of glass substrates by making them inaccessible to the environment.

7. Regarding these Claims, Yang does not teach the method wherein (a) the liquid organic-based solution is selected from the group consisting of siloxane and silsesquioxane, and (b) the isolation of Si-OH groups from the environment restrains the occurrence of electro-osmotic flow.

8. Regarding the first limitation, Holloway teaches that it is known to perform surface derivatization of free silica groups in silica capillaries by first reacting the silica surface with organosiloxanes (see Column 3, lines 62 – 67, and Column 4, lines 1 – 4) in a process in which the polyorganosiloxane is further reacted with other moieties in order to produce a coated tube. Moreover, Yang specifically teaches, in Column 1, lines 54 -- 58, that it is known to derivatize the surface of silica capillaries with “other chemical modifications ..., such as ... polysiloxanes." Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Yang by employing a surface derivatization step that employs a siloxane as the liquid organic-based solution as taught by Holloway in the overall process taught by Yang to have achieved the surface coating taught by Yang with a reasonable expectation of success, because Holloway teaches that surface derivatization of silica capillaries with organosiloxanes is known in the art.

9. Regarding the second limitation, as discussed, Yang in view of Holloway does not teach the method wherein the isolation of Si-OH groups from the environment restrains the occurrence of electro-osmotic flow. However, Novotny explicitly teaches that it is well known in the art to modify the surface of silica capillaries in order to reduce/restrain/eliminate electro-osmotic flow (see Column 1, lines 33 – 68, and Column 2, lines 1 – 19). Novotny specifically teaches, in Column 1, lines 53 – 68, that “the suppression of electroosmotic flow in chromatographic, and particularly electrophoretic, systems is one of the goals addressed by the present invention … Protein adsorption is of particular concern in systems

which are susceptible to electroosmotic flow, since the adsorbed protein affects the wall characteristics, including the zeta potential." Novotny further teaches, in Column 2, lines 9 – 18, that "various methods of reducing or eliminating protein adsorption by silica surfaces are reported in the literature, … [by] chemically bonding a neutral material to the silica surface to eliminate the surface charges which function as adsorption sites." Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Yang in view of Holloway by bonding to the organosiloxane surface-derivatized silica capillary a neutral material that reduces or eliminates protein adsorption by reducing or eliminating electroosmotic flow as taught by Novotny in order to have improved the accuracy and reproducibility of analyses and separations (see Column 1, lines 59 – 64 of Novotny).

10. Regarding Claims 6 and 17, Yang teaches the method wherein said step of heat treatment is conducted in the air (see Column 12, lines 10 – 13).

11. Regarding Claims 11 and 22, Yang teaches the method wherein the material of said glass microchannels is an other glass material (see Column 6, lines 51 – 53).

12. Claims 2, 4, 9, 10, 13, 15, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang in view of Holloway and Novotny, and further in view of Livesay, et al. (United States Patent 6,132,814, hereafter Livesay).

13. Regarding Claims 2 and 13, Yang in view of Holloway and Novotny does not teach the method wherein said liquid organic-based solution is an organic-based spin-on-glass. However, as discussed above, Holloway teaches that it is known to use polyorganosiloxanes, specifically polydimethylsiloxane (see Column 3,lines 64 – 67), as the surface derivatization moiety used to coat silica capillaries. Livesay teaches that it is known to coat/modify the surface of substrates with siloxanes by utilizing organic-based spin-on-glass (see Column 1, lines 27 – 29, 41 – 44, and 61 – 63). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Yang in view of Holloway and Novotny by utilizing a liquid organic-based spin-on-glass as the polydimethylsiloxane for the surface derivatization agent as taught by Livesay with a reasonable expectation of success, because Yang in view of Holloway and Novotny teaches that polysiloxanes are a

known chemical modifying agent for capillaries used in microfluidic devices and because Livesay teaches that spin-on-glasses composed mainly of siloxanes offer many process benefits over other well-known surface treatment/coating methods (see Column 1, lines 25 – 29).

14. Regarding Claims 4 and 15, Yang in view of Holloway, Novotny, and Livesay does not teach the method wherein the step of heat treatment comprises placing the glass substrates coated with the liquid organic-based solution in a furnace for heating. However, Livesay implicitly teaches just such a limitation, wherein curing of the siloxane polymer network is performed at very high temperatures (see Column 1, lines 60 – 67, and Column 2, lines 1 – 2), which necessarily must occur in a high temperature furnace. As mentioned, Yang teaches that the silylation reagent is cured after it is used to treat the surface of capillaries (see Column 12, lines 7 – 13). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Yang in view of Holloway, Novotny, and Livesay by curing the siloxane network produced by coating the substrate with a siloxane spin-on-glass at a high temperature as taught by Livesay in order to have cured the siloxane network, because Livesay teaches that it is known in the art to cure siloxane spin-on-glass coatings in such a manner.

15. Regarding Claims 9, 10, 20, and 21, Holloway teaches the method wherein said organic-based spin-on-glass has two side-linked functional groups R_1 and R_2 after cross-linking and solidification, and wherein R_1 and R_2 are CH_3 (polydimethylsiloxane; see Column 3, lines 64 – 67).

16. Claims 5, 7, 8, 16, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang in view of Holloway, Novotny, and Livesay, and further in view of Chen, et al. (United States Patent 5,286,675, hereafter Chen).

17. Regarding these Claims, Yang in view of Novotny, Holloway, and Livesay does not teach the method wherein the temperature during the step of heat treatment is 425 C and wherein said step of heat treatment is conducted in an inert gas environment comprising nitrogen. However, Chen teaches all of these limitations in a method in which a spin-on-glass siloxane layer is formed via liquid deposition and then heat treated/cured (see Column 2, lines 55 – 61, and especially Column 3, lines 7 – 16). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have

modified the method taught by Yang in view of Novotny, Holloway, and Livesay by performing the heat treatment/curing step at 425 C in an inert nitrogen ambient as taught by Chen with a reasonable expectation of success, because Chen teaches that it is known in the art to so cure siloxane spin-on-glass coatings.

Response to Arguments

18. Applicant's arguments with respect to all Claims have been considered but are moot in view of the new ground(s) of rejection.

19. As noted by Applicants in Pages 6 and 7 of Remarks, all previous objections and rejections under 35 U.S.C. 112, 2nd Paragraph, have been properly addressed, and these objections and rejections are therefore withdrawn.

20. Due to Applicants' amendments, the previous rejections to Claims 1, 6, 11, 12, 17, and 22 under 35 U.S.C. 102(b) have been withdrawn.

21. Applicants essentially argue, on Pages 8 – 10 of Applicants' Remarks, that the previous rejections to Claims 2 – 4, 9, 13 – 15, and 20 under 35 U.S.C. 103(a) over Yang in view of Livesay are improper because these references do not teach limitations that previously were not claimed. The Examiner agrees with this argument, and new art has been applied.

22. In response to Applicants' argument that the original references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., restraining, reducing, or eliminating the occurrence of electro-osmotic flow) were not originally recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

23. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date

of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RONALD D. LAFOND whose telephone number is (571)270-1878. The examiner can normally be reached on M - F, 9:30 AM - 6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on (571) 272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. D. L./
Examiner, Art Unit 1792

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1792